UNTETHERED TRAILER TRACKING SYSTEM PILOT TEST

Amy Houser

FMCSA Technology Division

Tuesday, January 8, 2008

U.S. Department of Transportation
Federal Motor Carrier Safety Administration

FMCSA's Security Role

- DOT has a supporting role with DHS to improve the secure transportation of hazardous materials
- FMCSA Technology Initiatives
  - Hazardous Materials Field Operational Test
  - Untethered Trailer Tracking System Pilot Test
  - Expanded Satellite Communications Pilot Test
  - Truck Disabling Technology Study

Trailer Vulnerabilities to Theft

- Unattended Trailers
  - Trailer Stockpiling
  - Lengthy yard checks
  - Erroneous pickups
  - Increased opportunities for theft
- Lack of in-transit visibility
  - Subcontracting to trucking companies to haul certain loads, losing trailer visibility at the switch
  - Delays at shippers when trailers are empty

Untethered Trailer Tracking System Project Purpose

"…leverage existing technology and develop an untethered trailer tracking and control system that will provide real-time trailer identification, location, geo-fencing, unscheduled movement notification, door sensors, and alarms."

– Department of Transportation and Related Agencies Appropriations Bill, 2003

Project Partners

- Industry Expert Panel
  - Landstar
  - JB Hunt
  - Geologic Solutions
  - Skybitz
- Federal Agency Review Team
  - TSA
  - DOD
  - MARAD
  - FHWA
  - PHMSA

Pilot Test Overview

- 3-month pilot test
- 3 Scenarios:
  - Truckload Dry Van
  - High Value
  - Truckload Explosives
- 75 Trailers

Baseline Typical Operations

- Lengthy time of unknown status
  - Untethered: 2-7 days where its status was unknown to all carriers
  - Cargo In transit: 1-2 days where the visibility into cargo status was limited or non-existent
  - Not at company locations: Trailer locations or status related to cargo unknown to one carrier
- Site operations
  - 5-6 hours spent searching for one particular trailer
  - 3-10 days before trailers were picked up
  - Up to 25 trailers sitting idle and unavailable to the carrier

Trailer Mobile Communications and Sensors

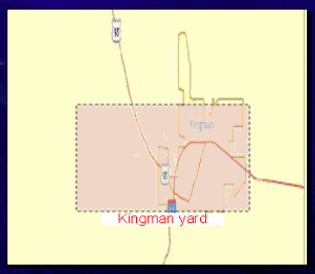
- Terrestrial UTT System
  - GPS and cellular communications antennas
  - Rechargeable battery

- Ultrasonic Cargo Sensor
  - Detects cargo status change from empty to full and full to empty

- Magnetic Door Sensor
  - Monitors when a trailer door is opened or closed

Geo-fencing and Trailer Connection Status

- Geo-fencing
  - Notification of a trailer moving outside of its geo fence
  - Capability to increase the position polling rate after geofence violation



- Trailer connection and disconnection status

Security Benefits

- Theft reduction
  - Notifications of door opening and cargo status changes
  - Ability to track and recover stolen trailers
- Improved unauthorized trailer movement detection
  - Information about unauthorized disconnections or connections
  - Visibility into trailer locations

Operational Efficiency Benefits

- Improved asset management
  - Ability to find trailers and expedite deliveries through knowledge of trailer arrivals, unloading, and loading
  - Collection of detention charges with system data
  - Enhanced visibility of trailers and their cargo
  - Less time needed to rotate trailers for deliveries, which prevents the use of trailers as storage
  - Reduction of trailer to tractor ratios

New Systems Today

- Improved mapping (Google)
- Custom polygonal landmarks
- New trailer applications (flatbed, tanker, reefer, container)
- Solar charging system
- Smart sensor departure and arrival data
- Idle time reports
- Custom reporting

Thank you for your attention!

Contact Information:

Amy Houser

amy.houser@dot.gov

(202) 385-2382

Celadon

Celadon Trucking Services

Tuesday, January 8, 2008

(800) CELADON
www.celadontrucking.com

About Celadon

- Trucking Operations:
  - 2,900 tractors (including 350 Canadian, 250 Mexican)
  - 8,100 trailers
- 950 Miles Average Length of Haul
- 52% Domestic/U.S.
- 48% Crosses Mexican or Canadian border
- Strong Driver Base
- Safety Focus
- Technology Focus
- Non-Asset Based Businesses

Trailer Tracking Objectives

- Decrease in Trailer Idle Time Costs
- Decrease in Fuel Costs Searching for Trailers
- Increase in Trailer Detention Billing
- Improve Truck Productivity
- Increase Trailer and Cargo Security

Current Deployment

- Installed on 3,000+ units
- All units deployed with cargo sensor
- Full integration with operational system

Exception Based Integration

- Trailer Connect
- Trailer Disconnect
- Cargo Loaded
- Cargo Empty
- Geo-Fence
- Status Report (Pings)
- Low Battery
- Battery Replacement

Exception Based Alerts

- Connect
  - Tractor not assigned to trailer that it is being connected to
- Disconnect
  - Tractor disconnecting at an unauthorized location
  - Trailer disconnected at a customer location not identified as a drop location

Exception Based Alerts

- Loaded
  - Trailer loaded detected but order is not generated in system
- Empty
  - Tractor attached to trailer specified as a drop location
- Geofence
  - Trailer being pulled by non-Celadon equipment
  - Trailer departing geo-fence is not assigned on an order

Trailer Tracking Benefits

- Improved business operations and customer service
- Reduced wasted fuel
- Improved driver and tractor productivity
- Enhanced detention billing
- Increased trailer and cargo security
- Increased visibility of freight during third-party moves
- Optimized trailer inventory pools and reduced yard checks
- Provides mechanism for auto arrive and depart

Celadon

Implementation Hurdles

- In order to recognize a connect or disconnect, the tractor must have a special in-line fuse.
- Coordination of equipment installations
- Quality control and diagnostic checks prior to trailer being released to the fleet
- Training of maintenance staff to troubleshoot potential hardware issues
- Systems integration
- Training of Operations staff in handling alert events

Celadon

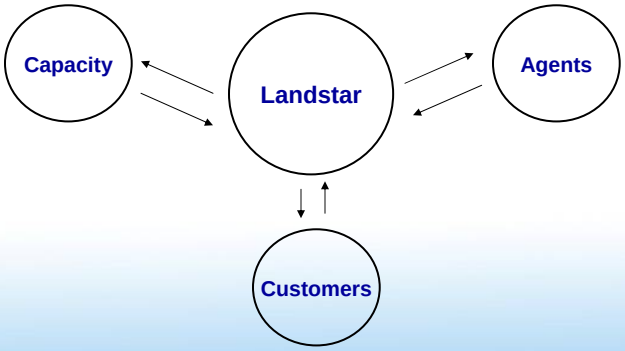
the road to success

LANDSTAR

Model Definition

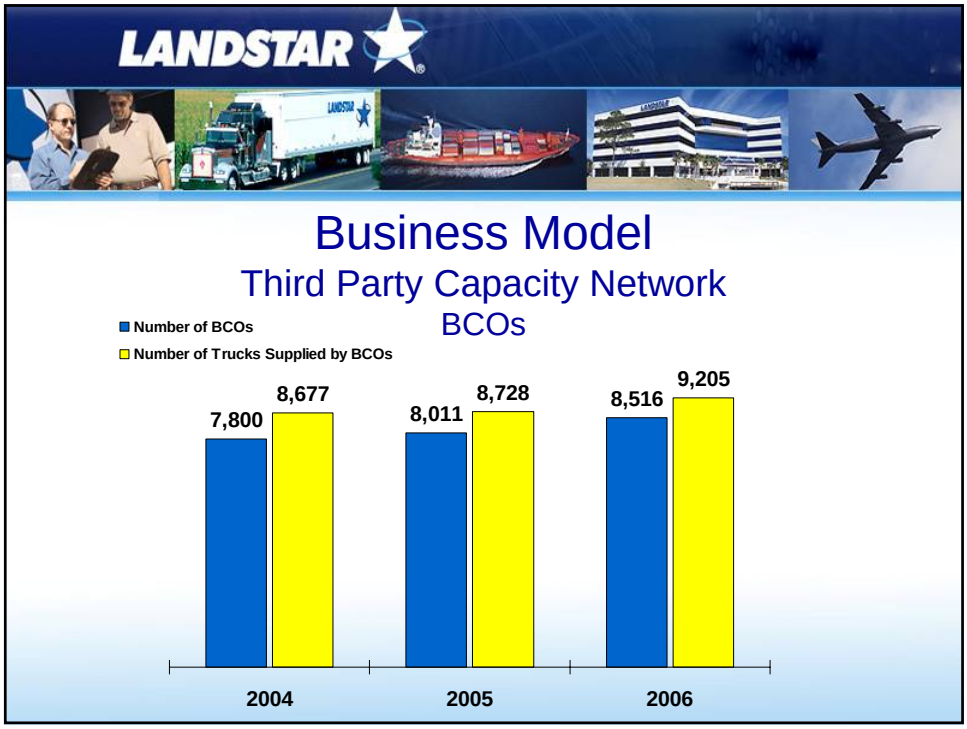
Landstar is a non-asset based provider of transportation capacity delivering safe, specialized transportation services to a broad range of customers utilizing a network of agents, third party capacity owners and employees.

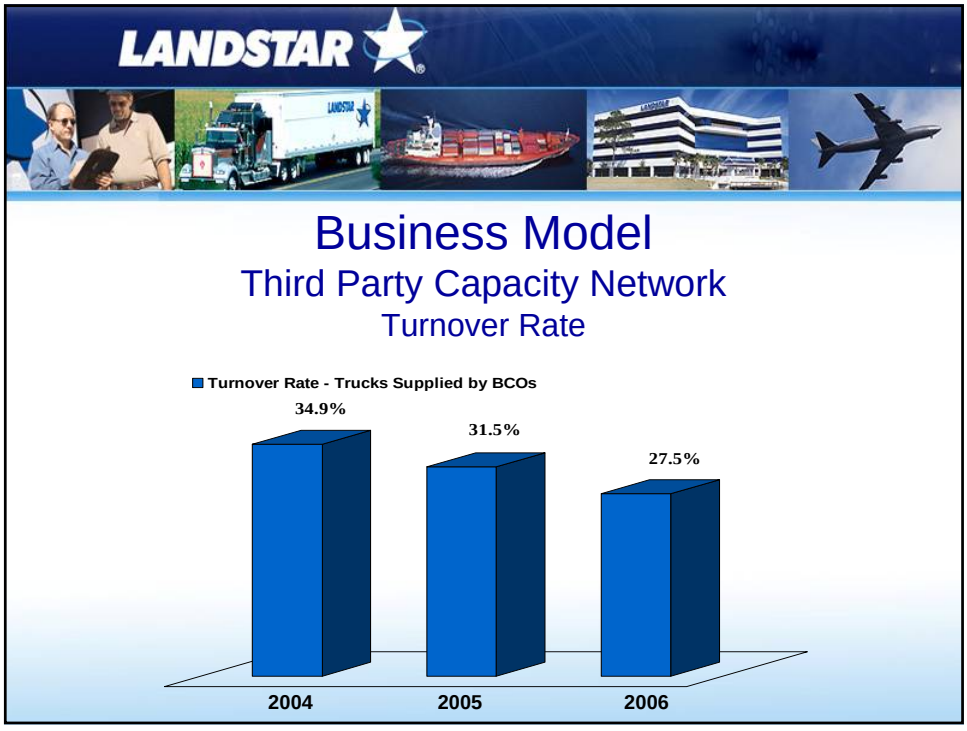
Business Model
Network Connection
Information Flow

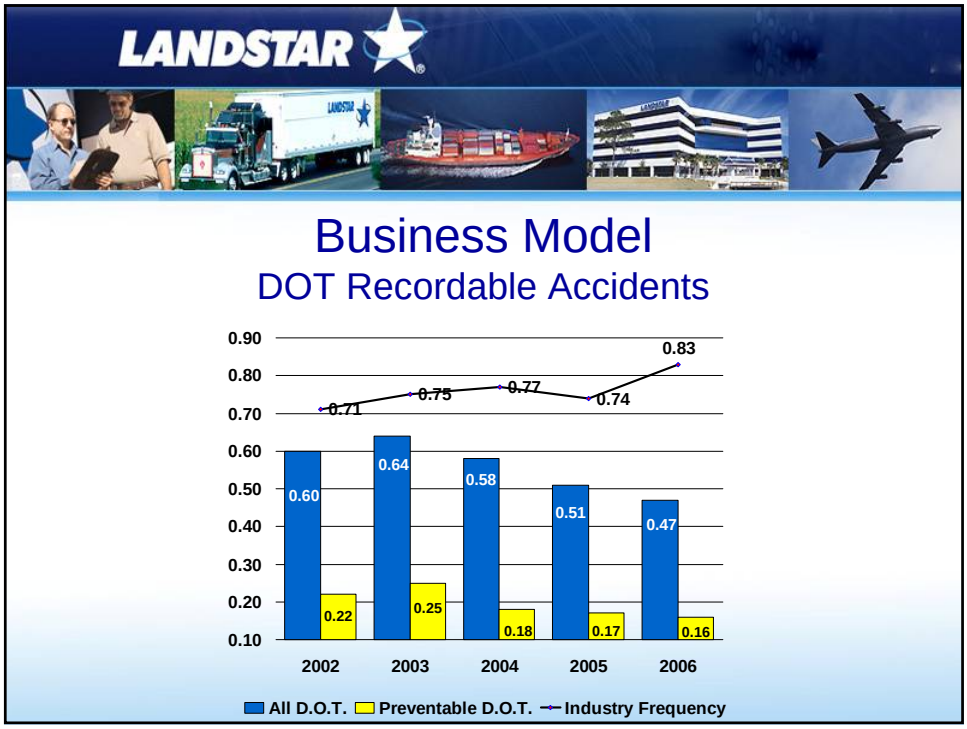


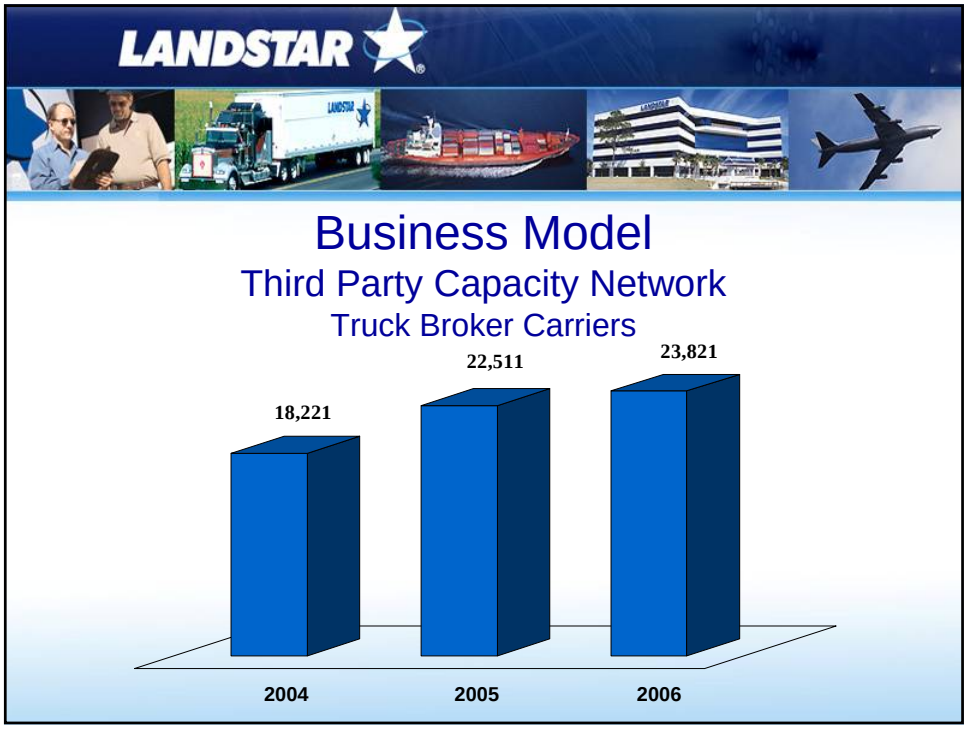
Business Model
Third Party Capacity Network

- Business Capacity Owners (BCOs)
- Broker carrier capacity
- Railroads
- Air cargo carriers
- Ocean cargo carriers
- Warehouse Capacity Owners (WCOs)


LANDSTAR
Business Model
Third Party Capacity Network
BCOs
Number of BCOs
Number of Trucks Supplied by BCOs
7,800
8,677
8,011
8,728
8,516
9,205
2004
2005
2006


LANDSTAR
Business Model
Third Party Capacity Network
Turnover Rate
Turnover Rate - Trucks Supplied by BCOs
34.9%
31.5%
27.5%
2004
2005
2006


LANDSTAR
Business Model
DOT Recordable Accidents
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.71
0.75
0.77
0.74
0.83
0.60
0.22
0.64
0.25
0.58
0.18
0.51
0.17
0.47
0.16
2002
2003
2004
2005
2006
All D.O.T.
Preventable D.O.T.
Industry Frequency


LANDSTAR
Business Model
Third Party Capacity Network
Truck Broker Carriers
18,221
22,511
23,821
2004
2005
2006

Landstar's Search for a Tracking System

- Landstar started looking at tracking systems in 1997:
  - Landstar's purpose of finding a tracking system was to better track and control our assets
  - Landstar researched the advantages and disadvantages of a tethered and an untethered system
  - Landstar weighed the advantages and disadvantages of GPS versus Cellular
  - Landstar leased 300 Xtra-leases trailers equipped with a tethered Terrion tracking system as a test subject

Landstar's Search for a Tracking System

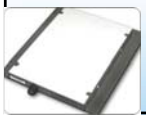
- Results of Landstar's Research:
  - In 2002, Landstar decided at that time that an untethered tracking system would fit our needs best. There were several reasons:
    - Make up truck fleet
      - Most model year tractors built around 1997 or before did not have constant power to the center pin on the seven way, which is necessary to recharge a tethered units battery.
    - At least half the fleet was to be retrofitted and we needed an application the could be installed easily on a loaded trailer.
  - Ease of install
  - Small and Covert
  - Preferred a device that limited warranty issues by manufactures such as penetrating the skin of the trailer with a tethered systems antenna.
  - Data from device must be able to be integrated into Landstar's system.
  - Landstar needed an upgradeable system which can change with our business environment

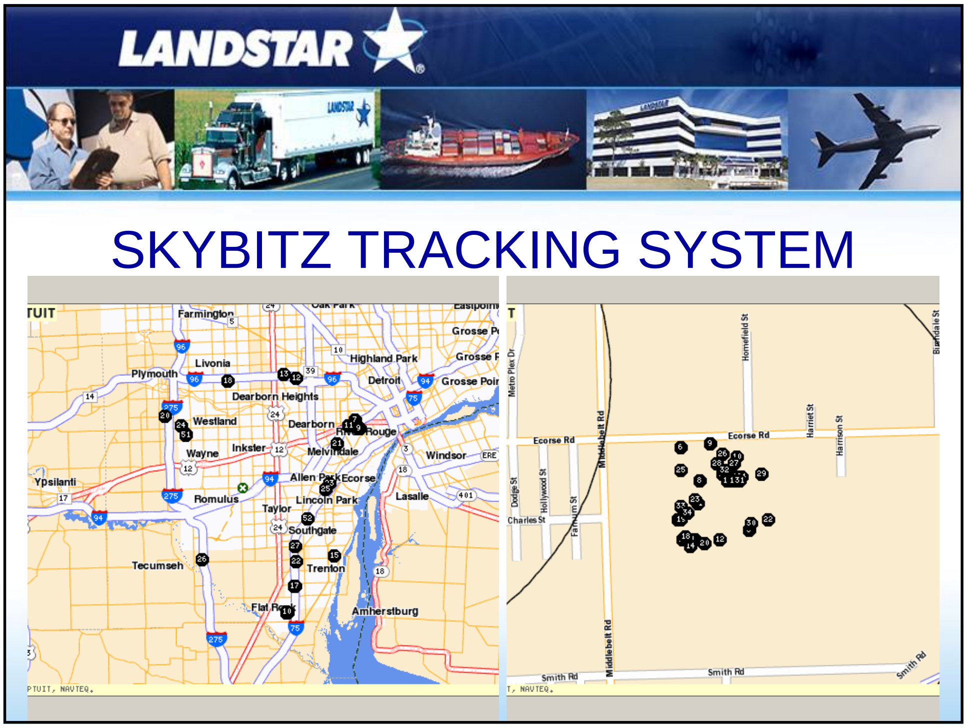
Benefits of Utilizing a Tracking System

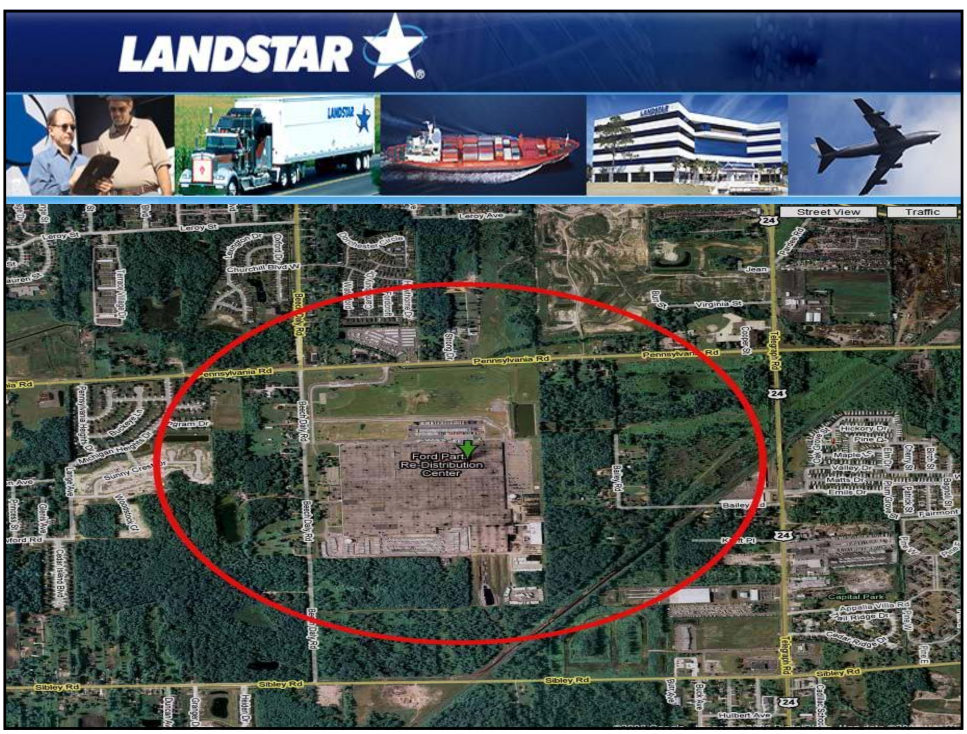
- Increased revenue and loads per trailer due to improved utilization of equipment
- Allows Landstar to service their customers in an efficient manner
- Helps improve safety and compliance
- Assists in retention efforts with Business Capacity Owners
- Able to manage maintenance schedules of equipment
- Assists in theft prevention and recovery of lost or stolen equipment
- Skybitz System allows Landstar agents to utilize Brokerage Carrier Partners

Skybitz: Future Benefits

- Track and Trace; shows the tractor id when it is hooked and when it unhooks from a trailer
- Smart sensor tracking
- Door sensors; it allows Landstar to see when the trailer doors are opened or closed
- The use of cargo sensors
- Skybitz is able to be upgraded to help meet our changing business environment
- Customers will have the ability to track their shipments on their schedule




LANDSTAR
SKYBITZ TRACKING SYSTEM
Farmington
Livonia
Plymouth
Highland Park
Detroit
Dearborn Heights
Westland
Dearborn
River Rouge
Inkster
Melvindale
Wayne
Windsor
Ypsilanti
Allen Park
Ecorse
Romulus
Lincoln Park
Lasalle
Taylor
Southgate
Tecumseh
Trenton
Flat Rock
Amherstburg
Ecorse Rd
Middlebelt Rd
Smith Rd
Charles St
Homefield St
Harriet St
Harrison St
Metro Plex Dr
Dodge St
Hollywood St
Farnum St
Birchdale St


LANDSTAR
Street View
Traffic
Pennsylvania Rd
Sibley Rd
Telegraph Rd
Ford Part
Re-Distribution
Center

Presentation Summary

- Helps improve safety and compliance
- Helps service our customers more efficiently
- Improves utilization of Landstar equipment
- Assists in the recovery of missing or stolen trailers
- Has allowed Landstar to utilize our Brokerage Capacity Partners
- Skybitz is a covert system
- Skybitz is an upgradeable system
- Has allowed Landstar to increase the loads per trailer, which has increase revenue through better utilization
- Manage maintenance repairs and inspection schedules more efficiently

the road to success

LANDSTAR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TRACKING SYSTEMS
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